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09/806,626	04/02/2001	Siu-Wai Wu	GIC-551	3330

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EXAMINER	
VO, TUNG T	

ART UNIT	PAPER NUMBER
2613	

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/806,626	WU, SIU-WAI	
	Examiner	Art Unit	
	Tung T. Vo	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 September 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15 and 31-47* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15,27,31 and 36-46* is/are rejected.

7)☒ Claim(s) *32-35 and 47* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 April 2001* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see the remarks, filed 09/23/04, with respect to the rejection(s)of claim(s) 1-12, and 27 under 35 U. S. C 102 (e), Borgwardt reference, have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Kondo et al. (US 5,815,209) and Katta et al. (US 6,115,421).

Withdraw Allowable Subject Matter

2. The indicated allowability of claims 31, and 36-46 is withdrawn in view of the newly discovered reference(s) to Kondo et al. (US 5,815,209) and Katta et al. (US 6,115,421). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-12, 27, and 43 are rejected under 35 U.S.C. 102(e) as being anticipated by Kondo et al. (US 5,815,209).

Re claim 1, Kondo discloses apparatus and its a method for controlling the quantization in a digital video encoder (fig. 7) that comprises a plurality of parallel compression engines (183-185 of fig. 7)), wherein the master controller (196 of fig. 7) comprising

means (196 of fig. 7) for determining a target quantization level for a video frame (the maximum range of quantization matrix or level, col. 16, lines 40-50);

wherein the video frame is represented by a plurality of panels (divided frames 152, 153, 154 of fig. 6A) , each panel comprises a plurality of slices (slices 155-158 of fig. 6A), and each panel (divided frame) is processed in parallel by a respective one of the compression engines (the divided frame signal (198) is encoded by the encoder (183) of fig. 7);

means (183 of fig. 7) encoding the first slice of each panel in accordance with said target quantization level (the slice (155) is encoded based on the encoding control signal (206) (quantization level), see col. 16); and

means (183 of fig. 7) encoding subsequent slices (156, 157, 158 of fig. 6A) in each panel in accordance with a quantization level (206 of fig. 7) that is allowed to vary from said target quantization level until the last slice of each panel is reached (the division controller adjusts the encoding control signal (quantization level or matrix) for each slice, or block, or frame); wherein the quantization level used for encoding the last slice of each panel is driven toward said target quantization level (the quantization level is adjusted to the maximum range of the quantization level).

Re claim 2, Kondo further discloses wherein driving step uses piecewise linear feedback (206 of fig. 7) to drive the quantization level (the encoding control signal (206 of fig. 7) indicates the condition such as the quantization level in the maximum range, which means the quantization level of the last slice of the image panels is toward the maximum (predetermined) quantization level) of the last slice of each of said image panels toward said target quantization level.

Re claim 3, Kondo further discloses wherein said feedback avoids abrupt variations in the quantization level between the first and last slice of each of said image panels (207 and 206 of fig. 7).

Re claim 4, Kondo further discloses wherein a group of pictures (GOP) target bit rate is adjusted based on a number of film pictures and non-film pictures currently in a processing pipeline of at least one of said compression engines (the division controller adjusts the GOP target bit based on the inter (motion film pictures) frames an intra frame (non motion film pictures).

Re claim 5, Kondo further discloses wherein a higher target bit rate is provided for non-film pictures (the intra pictures are required more target bit rates than the inter pictures, MPEG-2 standard).

Re claim 6, Kondo further discloses the quantization level used for encoding-the last slice of each panel is driven toward said target quantization level such that the first slice and the last slice of each panel are encoded in accordance with approximately the same quantization level (the first slice and last slice are encoded at the same quantization level base on the encoding control signal (206 of fig. 7)).

Re claim 7, Kondo further discloses a buffer level of said video encoder is used to control the start of a new group of pictures (the controller (196 of fig. 7) controlling the buffer for next GOP according to MPEG standard).

Re claim 8, Kondo further discloses wherein said panels are simultaneously compressed at the respective compression engines during a frame time (183-185 of fig. 7, e.g. the encoders are encoding the divided picture signals 198-200 of fig. 7 are the same manner, the same time, based on the encoding control signal (206)).

Re claim 9, Kondo further discloses wherein the compressed panel data are stored locally at the compression engines for subsequent transfer to a video buffer of the video encoder within a next frame time (189-194 of fig. 7)).

Re claim 10, Kondo further discloses wherein data are retrieved from said buffer, to form a transport packet, at an average rate equal to a specified video bit rate whenever the buffer has at least one transport packet payload's worth of data (195 of fig. 7).

Re claim 11, Kondo further discloses wherein null packets are substituted for video packets to maintain a constant transport bit rate whenever said buffer level falls below one transport packet payload's worth of data (code sequence, 204 of fig. 7, has constant bit rate).

Re claim 12, Kondo further discloses wherein a reference quantizer scale is calculated for each of said compression engines (quantization matrix is already calculated for each compression engines (183-185 of fig. 7)).

Re claim 43, Kondo further discloses the division controller (196 of fig. 7) delaying a new GOP if there is insufficient space in an encoder buffer (183 of fig. 7) to accommodate an I frame (MEPG-2 encoding standard).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 13-15 and 31, 36-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo et al. (US 5,815,209) and in view of Katta et al. (US 6,115,421).

Re claims 13-15, 31, and 36-46, Kondo further suggests that MPEG encoder would be used in the apparatus (fig. 7) having and the buffer fullness level of the video encoder is provided by the sum of the levels of the encoder buffer and levels of local buffers at each compression engine (fig. 7) but Kondo does not particularly teach the reference quantizer scale for the compression engine is calculated and the computing of target quantization level based on a complexity estimates from the number of past frames of the MEPG encoder as claimed.

However, Katta teaches a MPEG standard encoder (figs. 1 and 3-20) to calculate the quantizer scale for the compression engine (6 of fig. 3, see also fig. 5), and compute the target quantization level based on a complexity estimates from the number of past frames of the MEPG encoder (figs. 6, 8, 15a, 15b, 16-17), wherein the reference quantizer calculated based on the target quantization level; an accumulation of quantizer scale values (16 of fig. 5, e.g. q_scale) for

each compression engine (sum_quant), an accumulation (13-15 of fig. 5) of the number of bits generated on each compression engine (bitcount); an accumulation (15 of fig. 5) of the number of macroblocks processed on +he+ each compression engine (MBcount); and a fullness level (MAXIMUM TRANSMISSION RATE of fig. 5) of a video buffer of the video encoder (buffer level), wherein the compression engine modifies its reference quantizer scale based on a local buffer fullness to generate a final quantizer scale value for use in quantization (112 of fig. 1, and 6 and 7 of fig. 3, see also VBV_Buffer_fullness, see fig. 7, col. 8, lines 43-60); wherein a panic mode is initiated by the compression engine if the final quantizer scale value is higher than a predetermined maximum value, said panic mode maintaining the quantization at or below said predetermined maximum value (S26 of fig. 15a, e.g. S27-S30 of fig. 15b); computing said target quantization level based on a complexity estimates from a number of past frames (figs. 16 and 17), wherein: a complexity value (S6 and S7 of fig. 6a) of the most recently encoded I-frame is used as the complexity estimate for a current I-frame (e.g. calculating the complexity of CI, I frame); an average of the complexity values of the four most recently encoded P-frames are used as the complexity estimate for a current P-frame (S6 of fig. 6b); and an average of the complexity values of the four most recently encoded B-frames are used as the complexity estimate for a current B-frame ((S6 of fig. 6b), see also figs. 7 and 8).

Moreover, Katta teaches the encoder buffer is a central buffer for the video encoder (7 of fig. 3, see col. 8, lines 43-60); setting a target buffer fullness level at the start every GOP (fig. figs. 10a, 10b, and 10c; see also col. 8, lines 32-65); the buffer fullness level is driven to the target buffer fullness level using feedback control at the start of every GOP (S12 of fig. 6b); determining a target number of bits to be generated during encoding of each group of pictures

(GopTarget) (S10 of fig. 6b); determining a target number of bits to be generated during encoding of each frame (FrameTargetBits) (fig. 8); and allocating the GopTarget bits among each frame in the group of pictures in proportion to the complexity estimates for each frame (16 of fig. 5); scaling the complexity estimates for each frame by a corresponding weighting factor to account for different perceptual and statistical characteristics between P, and B frames (figs. 16, and 17; e.g. quantization scale); bounding the FrameTargetBits to a fraction of a maximum allowable number of bits for the frame to avoid panic mode (fig. 7, e.g. upper and lower limits, col. 8, lines 18-60); setting a lower bound for the target quantization level for P and B frames if the quantization level for the current P B frame is lower than a previous quantization level for a corresponding P or B frame (col. 8, lines 43-60, e.g. B-picture); delaying the encoding of a new Group of Pictures (GOP) if there is insufficient space in an encoder buffer to accommodate an I frame (2 of fig. 3, e.g. for delaying GOP controlled by the controller (6 of fig. 3)); determining a maximum number of bits encoding of the current frame is allowed to generate (FrameMaxBits) (12 of fig. 4); initiating a panic mode below a threshold, said panic degradation in video quality in the event that FrameMaxBits falls mode allowing a graceful (S20-S26 of fig. 15a); in the event that FrameMaxBits falls below a first threshold, non-intra DC coefficients are preserved during panic mode encoding, while other DCT coefficients are dropped (PICTURE SKIP SIGNAL OUTPUT, S27 of fig. 15a); in the event that FrameMaxBits falls below a second threshold which is lower than said first threshold, the of the non-intra DC coefficients is scaled to reduce the magnitude of the non-intra DC coefficients (S27, S29 of fig. 15b).

Taking the teachings of Katta and Kondo as a whole, it would have been obvious to one of ordinary skill in the art to incorporate the teachings of Katta into the encoding apparatus of

Kondo for the same purpose of encoding video image for each panel. Doing so would allow the encoding apparatus and method capable of distributing bits appropriately depending on the difficulty in encoding moving picture and of controlling an optimum quantizing width on the basis of the target number of generated in one picture segment group.

Allowable Subject Matter

7. Claims 32-35 and 47 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Liu et al. (US 6,731,685 B1) discloses a method and apparatus for determining a bit rate need parameter in statistical multiplexer.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tung T. Vo whose telephone number is (703) 308-5874. The examiner can normally be reached on 6:30 AM - 3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris. Kelley can be reached on (703) 305-4856. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TUNG VO
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